

# INSTRUMENT ASSISTED SOFT-TISSUE MOBILIZATION: A COMMENTARY ON CLINICAL PRACTICE GUIDELINES FOR REHABILITATION PROFESSIONALS

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## ABSTRACT

Instrument assisted soft-tissue mobilization (IASTM) has become a popular myofascial intervention for sports medicine professionals. Despite the widespread use and emerging research, a consensus on clinical standards, such as a describing the intervention, indications, precautions, contraindications, tool hygiene, safe treatment, and assessment, does not exist. There is a need to develop best practice standards for IASTM through a universal consensus on these variables. The purpose of this commentary is to discuss proposed clinical standards and to encourage other sports medicine professionals and researchers to contribute their expertise to the development of such guidelines.

**Key Words:** ASTYM®, Graston®, instrument assisted soft tissue massage, muscle soreness, myofascial, perceived pain, recovery

**Level of Evidence:** 5

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**Conflict of interest:** The authors have no conflict of interests to disclose regarding the content of this manuscript.

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## INTRODUCTION

Instrument assisted soft-tissue mobilization (IASTM) has become a popular myofascial intervention for sports medicine professionals. There are various IASTM companies such as RockTape®, HawkGrips®, Graston®, Técnica Gavilán®, Functional and Kinetic Treatment with Rehab (FAKTR)®, Adhesion Breakers®, augmented soft-tissue mobilization or ASTYM®, and Fascial Abrasion Technique™ that each teach their own treatment approach and design their own instruments (e.g., specific material, instrument shape). The popularity of IASTM has also prompted an emerging body of research on the efficacy of IASTM. The largest amount of research has been from case series<sup>1-5</sup> and case reports<sup>6-19</sup> (Level 4 evidence), which are limited due to their subjectivity. Most of the case reports describe successful treatment of tendinopathies,<sup>2,4,7,8,10-13,16,18,20</sup> arthrofibrosis<sup>17,21</sup>, and individuals with cerebral palsy.<sup>22,23</sup> Recently, higher level controlled investigations have been published with researchers investigating the effects of IASTM on musculoskeletal pathologies,<sup>18,21,24-27</sup> trigger points,<sup>28</sup> range of motion,<sup>29-32</sup> post mastectomy,<sup>32</sup> post total joint arthroplasty,<sup>31,33</sup> and on various performance measures.<sup>18,24,25,29,30,34-38</sup>

Recently, three systematic reviews have been published, which all appraised IASTM randomized controlled trials using similar search criteria, but reported mixed outcomes among the existing research.<sup>39-41</sup> Lambert et al<sup>40</sup> reported the results of seven qualified studies based upon their search criteria. The researchers concluded IASTM may be an effective treatment intervention for reducing pain and improving function over a treatment span of less than three months for several different conditions of the spine, upper extremity, and lower extremity. Further, IASTM may provide myofascial release, interruption of nociception, and improve mobility of underlying tissue.<sup>40</sup> Cheatham et al<sup>39</sup> also reported the results of seven qualified studies, concluding the methodological variability among studies created a weakness in the knowledge regarding the therapeutic effects of IASTM. There appeared to be some evidence supporting IASTM producing short-term changes in joint range of motion (ROM).<sup>27</sup> Nazarri et al<sup>41</sup> reported on nine qualified studies and concluded the current evidence does not support the use of IASTM to improve pain, ROM, or function in

individuals with and without upper extremity, lower extremity, or spinal conditions. The mixed results among reviews demonstrates the variability among research methodology. Overall, a body of evidence does exist to support the clinical efficacy of IASTM but is still evolving. This will be further discussed in a later section.

Despite the increase in IASTM companies and research, there seems to be a lack of discussion regarding the clinical standards for the delivery of IASTM, such as describing the intervention, indications, precautions, contraindications, tool hygiene, safe treatment, and assessment. A recent search of peer reviewed literature (conducted June 2019) from electronic databases (i.e., PubMed, PEDro, Science Direct, and EBSCOhost) revealed few manuscripts discussing these topics. In contrast, another myofascial intervention, the traditional eastern medicine instrument assisted massage technique of Gua sha,<sup>42</sup> has a body of literature discussing the intervention including treatment protocols,<sup>43</sup> side effects,<sup>44-46</sup> and safety standards.<sup>43</sup> Currently, IASTM protocols may lack such stated guidelines, which creates a challenge for sports medicine professionals who administer IASTM as an intervention for clients with different musculoskeletal pathologies, as well as for researchers studying the effects of the technique.

There is a need to develop best practice standards for IASTM through a universal consensus of the topics noted in the prior section. The purpose of this commentary is to discuss proposed clinical standards, and to encourage other sports medicine professionals and researchers to contribute their expertise to the development of such guidelines. Due to the lack of standards, this commentary will synthesize and reference existing evidence from other manual and myofascial therapies as they relate to this discussion. The following sections will be divided into seven content areas discussing IASTM description, indications, precautions, contraindications, tool hygiene, safe treatment, and assessment.

## DESCRIPTION

IASTM is a skilled myofascial intervention thought to be based upon the rationale by James Cyriax.<sup>1,2</sup> Unlike the Cyriax approach utilizing digital cross friction, IASTM is applied using specially designed

instruments to provide a soft-tissue massage or mobilization.<sup>2</sup> The use of the instrument is thought to provide a mechanical advantage for the clinician by allowing deeper tissue penetration, vibration feedback sense, and more specific treatment, while also reducing imposed stress on the hands.<sup>2-4</sup> Using instruments for soft tissue mobilization is theorized to increase vibration sense by the clinician and patient. The increased perception of vibration may facilitate the clinician's ability to detect altered tissue properties (e.g., identify tissue adhesions) while facilitating the patient's awareness of altered sensations within the treated tissues.<sup>2,5</sup>

Despite the rationale behind the intervention, there seems to be a lack of a universal description for the term "IASTM". Researchers have used the name IASTM<sup>5,16,17,19,28-30,36,39,40,47-57</sup> and other names such as but not limited to: instrument assisted soft-tissue treatment,<sup>34</sup> instrument assisted cross fiber massage,<sup>58</sup> instrument assisted neuromobilization,<sup>59</sup> ASTYM<sup>®</sup>,<sup>18,20,23,27,32,33,37</sup> and Graston<sup>®</sup> treatment.<sup>1,2,4,6-9,12,14,15,25,35,50,60,61</sup> A large number of researchers have used the term Graston<sup>®</sup> to describe the intervention but appear to not follow the specific Graston-recommended treatment protocol which includes examination, warm-up, IASTM treatment, post treatment stretching, strengthening, and ice.<sup>49</sup> Cheatham et al<sup>39</sup> in their review only found one clinical trial that followed the complete Graston<sup>®</sup> treatment paradigm. Perhaps, consistent nomenclature, such as using IASTM to represent an intervention using a specific manufacturer's instruments and using the name of the paradigm or technique (e.g. Graston<sup>®</sup>, ASTYM<sup>®</sup>) to represent a pre-determined set of interventions would provide a clearer understanding for professionals and researchers.

Additionally, Gua sha is another instrument assisted treatment system often grouped with the previously mentioned forms of IASTM, but is considered to be different.<sup>42</sup> Gua sha is a popular eastern medicine treatment that traditionally uses a smooth edged instrument (e.g., water buffalo horn, honed jade, soup spoon) to scrape the skin until a red blemish appears.<sup>42,45</sup> The redness (i.e., petechiae) caused by the scraping is believed to be blood stasis (Figure 1). The Gua sha treatment is supposed to relieve blood stagnation and reduce pain.<sup>62</sup> Professionals may



**Figure 1.** Petechiae, as produced by different forms of instrument soft-tissue mobilization.

consider the Gua sha approach a form of IASTM, but the treatment rationale, goals, and application differs from the other IASTM approaches.<sup>42</sup> The efficacy of Gua sha will not be reviewed except for specific studies that are relevant to this discussion.

Given the lack of clarity, IASTM needs to also have a working description or explanation to clearly communicate the intervention to fellow sports medicine professionals and clients. A proposed description for IASTM may include the following: "*Instrument assisted soft-tissue mobilization is a skilled intervention that includes the use of specialized tools to manipulate the skin, myofascia, muscles, and tendons by various direct compressive stroke techniques*". A working description such as this may provide a clear understanding of the intervention and may prevent confusion between IASTM and other similar paradigms with specific multimodal treatment protocols such as Graston<sup>®</sup> and ASTYM<sup>®</sup>. Thus, sports medicine professionals may want to describe IASTM as a tool technique only (e.g., "stroke", treatment time, cadence, tool type), and then name a specific paradigm if the technique is used in conjunction with other predetermined interventions (stretching, exercise, other modalities, etc.) as guided by the teachings of the instructing body/company. Professionals and researchers should also consider using the Consensus on Exercise Reporting Template (CERT) which provides an organized process of reporting clinical interventions

using a 16-item checklist (in seven categories).<sup>63</sup> A 2017 commentary by Page, Hoozenboom, and Voight provides a more comprehensive discussion on this topic.<sup>63</sup> The full citation can be found in the reference section of this manuscript.

INDICATIONS

Currently, there is no consensus on the optimal IASTM intervention including: type of instrument, stroke technique, treatment parameters (e.g. time, angle, cadence), or applied pressure.<sup>39</sup> Despite the lack of universal agreement on optimal treatment parameters, the existing literature does support the use of IASTM as a treatment for several conditions (Table 1), and its effects on different physiological functions. For IASTM as a treatment, the existing body of research is mixed with the largest amount coming from case series or reports (Level 4 evidence). There is a growing amount of controlled clinical trials ( $\geq$  Level 3 evidence) supporting its treatment efficacy as reported in recent systematic reviews.<sup>39-41</sup> For physiological processes, there are several researchers who have found IASTM can influence several functions. The following section will describe the evidence for therapeutic and physiological efficacy.

Therapeutic Efficacy

Numerous authors have reported positive outcomes using IASTM (Table 1). The majority of case reports or case series describe a multimodal treatment program where IASTM was combined

with other therapeutic interventions, while few describe IASTM used as a stand-alone intervention, or whether IASTM was performed with or without concurrent muscle activation. Due to the evidence level and subjective nature of case reports and case series, sports medicine professionals must carefully interpret the outcomes and clinical scenarios when considering integrating the findings into their clinical practice.

Clinical investigations on the therapeutic effects of IASTM have also been published. Several intervention studies have reported favorable results with IASTM for carpal tunnel syndrome,<sup>25</sup> myofascial trigger points,<sup>28,34</sup> chronic low back pain,<sup>53</sup> non-specific thoracic spine pain,<sup>51</sup> ankle instability,<sup>35</sup> post mastectomy,<sup>32</sup> and post total joint arthroplasty.<sup>31,33</sup> Observational studies have also shown favorable results with improving posterior shoulder range of motion,<sup>29</sup> hip and knee ROM,<sup>30</sup> and ankle ROM.<sup>38,54,64,65</sup> Researchers have also demonstrated that pre-exercise IASTM had no significant effects on muscle performance measured by vertical jump height<sup>36,57</sup> and 40-yard sprint speed.<sup>57</sup>

Physiological Effects

Researchers have also found that IASTM changes local temperature<sup>60</sup> and has an effect on two-point discrimination and pressure pain threshold.<sup>56,66</sup> IASTM treatment may also have the potential for stimulating connective tissue remodeling through resorption of excessive fibrosis, along with inducing

Table 1. Suggested Instrument Assisted Soft-Tissue Mobilization Guidelines.	
Description	“Instrument assisted soft-tissue mobilization is a skilled intervention that includes the use of specialized tools to manipulate the skin, myofascia, muscles, and tendons by various direct compressive stroke techniques.”
Indications	Calf pain, <sup>16</sup> patellar tendinopathy, <sup>24</sup> knee arthrofibrosis post patellar tendon repair, <sup>17</sup> achilles tendinopathy, <sup>8,12</sup> Dupuytren’s contracture, <sup>86</sup> axillary web syndrome, <sup>53</sup> chronic costochondritis, <sup>87</sup> plantar fasciitis/heel pain, <sup>1,13</sup> lumbar compartment syndrome, <sup>15</sup> de Quervain’s tenosynovitis, <sup>7,11</sup> tibialis posterior strain, <sup>6</sup> medial epicondylitis, <sup>10</sup> lateral epicondylitis, <sup>4</sup> hyperactive gastrocnemius in hemiparetic stroke patient, <sup>57</sup> pseudo angina pectoris, <sup>88</sup> post-operative ACL repair, <sup>14</sup> benign joint hypermobility syndrome, <sup>59</sup> shoulder impingement, <sup>84</sup> hamstring tendinopathy, <sup>2</sup> individuals with cerebral palsy, <sup>22,23</sup> and tissue extensibility dysfunction. <sup>5,19</sup> carpal tunnel syndrome, myofascial trigger points, <sup>28,34</sup> chronic low back pain, <sup>51</sup> non-specific thoracic spine pain, <sup>49</sup> ankle instability, <sup>35</sup> post mastectomy, <sup>32</sup> post total joint arthroplasty, <sup>31,33</sup> posterior shoulder range of motion, <sup>29</sup> hip and knee ROM, <sup>30</sup> ankle instability, <sup>35</sup> and ankle ROM. <sup>52</sup>
NPRS: numeric pain rating scale; VAS: visual analog scale; ROM: range of motion	



repair and regeneration of collagen secondary to fibroblast recruitment.<sup>39,67</sup> In turn, this may result in the release and breakdown of scar tissue, adhesions, and fascial restrictions.<sup>39,67</sup> In laboratory studies using a rat model, the use of instruments resulted in increased fibroblast proliferation and collagen repair (e.g., synthesis, alignment, and maturation) in cases of enzyme-induced tendinitis.<sup>67-69</sup> Many of these benefits were also found in a laboratory study on ligament healing using the rat model which demonstrated that IASTM in an animal model produces a significant short-term (e.g., four weeks) increase in ligament strength and stiffness compared to the contralateral control limb.<sup>58,67</sup> While these findings provide initial support for IASTM stimulating connective tissue remodeling, these physiological changes are still being studied and have not been confirmed in human trials.

### Precautions and Contraindications

IASTM currently lacks a universal consensus on treatment precautions, and contraindications.<sup>39</sup> In contrast, therapeutic massage<sup>43,70-75</sup> and Gua sha<sup>43-46</sup> both have existing best practice and safety guidelines. A recent search of peer reviewed literature (conducted June 2019) from electronic databases revealed only

three publications that discussed recommended precautions and contraindications for IASTM.<sup>47,49,76</sup> The origin of the guidelines come from a 2008 study<sup>76</sup> that cited recommendations from a Graston® educational course. To date, no research has further examined or validated these recommendations. The suggested medical precautions are listed in Table 2 and contraindications are listed in Table 3. These guidelines are based upon the existing IASTM publications and the related myofascial intervention literature.<sup>43,49,70-77</sup> Specific medical conditions, such as but not limited to high pain sensation, acute inflammatory conditions, congestive heart disease/circulatory disorders, osteoporosis, cancer, pregnancy, diabetes, varicose veins, and hypertension, may be considered either precautionary or contraindicative depending on the client.<sup>49,70,74,76,77</sup> These conditions and others are listed in both categories. In the presence of such medical conditions, sports medicine professionals should conduct a thorough clinical exam to confirm that IASTM is a safe intervention for these individuals.

Another potential treatment precaution is the presence of petechiae after treatment. Petechiae are observed as red and purple spots due to bleeding from broken capillaries near the skin's surface from

Table 2. Precautions for Instrument Assisted Soft-Tissue Mobilization.	
<ul style="list-style-type: none"> <li>• Petechiae</li> <li>• Medications: NSAIDS, steroids, narcotics</li> <li>• Herbal supplements</li> <li>• Patient age, flu or flu like symptoms</li> <li>• Cancer</li> <li>• Hypertension</li> <li>• Acute inflammatory conditions</li> <li>• Post injection (e.g. steroid)</li> <li>• Unhealed closed or non-complicated fractures</li> <li>• Congestive heart disease, circulatory disorders</li> <li>• Kidney dysfunction</li> <li>• Diabetes</li> <li>• Body art</li> </ul>	<ul style="list-style-type: none"> <li>• Patient intolerance, hypersensitivity, high pain sensation due to injury</li> <li>• Medications: anti-coagulants, hormone replacement, fluoroquinolone antibiotics</li> <li>• Lymphadema</li> <li>• Osteoporosis</li> <li>• Vericose veins</li> <li>• Burn scars</li> <li>• Rheumatoid arthritis, ankylosing spondylitis</li> <li>• Polyneuropathy</li> <li>• Autoimmune disorders, RSD or chronic regional pain syndrome</li> <li>• Pacemaker or insulin pumps (treatment around devices)</li> <li>• Pregnancy</li> <li>• Abnormal sensations (e.g. numbness).</li> <li>• Allergies to metals, emollients, latex (professional wearing gloves)</li> </ul>

**Table 3.** *Contraindications for Instrument Assisted Soft-Tissue Mobilization.*

<ul style="list-style-type: none"><li>• Acute injury or infection (viral or bacterial), fever, or contagious condition</li><li>• Skin rash, open wounds, blisters, local tissue inflammation, or tumors</li><li>• Osteoporosis (advanced)</li><li>• Unhealed or unstable bone fracture</li><li>• Hematoma, myositis ossificans</li><li>• Acute or severe cardiac, liver, or kidney disease</li><li>• Neurologic conditions resulting in loss or altered sensation (e.g. Multiple Sclerosis)</li><li>• Metabolic conditions (e.g. Diabetes) or high-risk pregnancy</li><li>• Connective tissue disorders (e.g. Ehlers-Danlos syndrome, Marfan's syndrome)</li><li>• Medications that thin blood or alter sensations</li><li>• Chronic pain conditions (e.g. Rheumatoid Arthritis)</li><li>• Recent surgery or injury</li><li>• Severe pain felt by patient</li></ul>	<ul style="list-style-type: none"><li>• Petechiae (severe) or ecchymosis</li><li>• Treatment over surgical hardware</li><li>• Cancer or malignancy</li><li>• Hypertension (uncontrolled)</li><li>• Insect bite of unexplained origin</li><li>• Congestive heart disease, circulatory disorders</li><li>• Bleeding disorders (Hemophilia)</li><li>• Unhealed surgical site</li><li>• Peripheral vascular disease or insufficiency, varicose veins</li><li>• Thrombophlebitis or osteomyelitis</li><li>• Direct pressure over face, eyes, arteries, veins (varicose veins), or nerves</li><li>• Direct pressure over bony prominences or regions (e.g. lumbar vertebrae)</li><li>• Epilepsy (unstable)</li></ul>
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excessive pressure and/or friction applied by the tool (Figure 1).<sup>45,78</sup> Gua sha treatment is based upon creating petechiae as part of the therapeutic effects of the treatment.<sup>45</sup> Gua sha uses repeated compressing strokes with an instrument over a lubricated skin region until the petechiae appear.<sup>43</sup> Traditionally, IASTM practitioners have followed the same philosophy with a goal of achieving the same effects with treatment.<sup>43,49</sup> Clinically, petechiae can be considered a precaution or a contraindication (in severe cases) which may occur with treatment. Petechiae may be more prevalent in some regions of the body including: posterior calf, lateral thigh, anterior pelvic regions, and the cervical region.<sup>49</sup> Currently, it appears that sports medicine professionals and educators are moving away from the philosophy of creating petechiae due to potential tissue damage. The medical literature has also reported that petechiae created by a myofascial instrument or device may be considered iatrogenic tissue trauma.<sup>45,78,79</sup> Thus, sports medicine professionals should use good judgement and notify the patient of this potential consequence, while limiting further treatment after the onset of petechiae to prevent further tissue trauma.

The authors of this commentary suggest that bruising or ecchymosis at the site of treatment should be considered a contraindication. Traditionally, professionals may have considered both petechiae and ecchymosis as a necessary part of the treatment for different paradigms including Gua sha and IASTM.<sup>43,49,62</sup> Currently, it appears that sports medicine professionals and educators are also moving away from the philosophy of creating ecchymosis due to the potential iatrogenic tissue damage that can occur with treatment. In the presence of posttreatment ecchymosis, the clinician should likely refrain from further IASTM treatment and manage the region accordingly to ensure proper healing.<sup>43</sup>

The precautions and contraindications listed in this section are not all inclusive and should be considered a starting point for sports medicine professionals to build their own list based upon their patient population. Unfortunately, no consensus exists on this topic with only a few publications discussing guidelines. Future studies are needed to validate these topics and to develop best practices and safety guidelines for IASTM. This is especially important

for the occurrence of petechiae and ecchymosis since the harmful effects are still unknown.

**INSTRUMENT HYGIENE AND SAFE TREATMENT**

IASTM needs to have standard, best practice guidelines for instrument hygiene and safe treatment because tools are used to treat multiple patients. Currently, no published standards exist. A recent search of peer reviewed literature (conducted June 2019) from electronic databases revealed no current studies analyzing the instrument disinfecting process or safe treatment sequence. The IASTM instruments are often constructed of different materials such as but not limited to stainless steel, titanium, plastic, buffalo horn, stone, quartz, and jade. Regardless of material, the instruments should be considered a reusable medical device that should undergo proper hygienic procedures before and after patient treatment. Disposable or single use IASTM instruments may be beneficial to help prevent infections, but to the authors knowledge, manufacturers are only creating reusable instruments.

The main concern for sports medicine professionals is to determine if IASTM instruments should be classified as a critical, semi-critical, or non-critical item for sterilization according to the Center for Disease Control and Prevention (CDC).<sup>43</sup> Critical items (e.g., surgical instruments) may be in contact with sterile tissues or the vascular system requiring sterilization of the instruments for recurring use.<sup>80</sup> Semi-critical items (e.g., respiratory equipment) are in contact with mucous membranes or non-intact skin and require sterilization or high level chemical

disinfectants (e.g., Glutaraldehyde) to clean before reuse (Table 4).<sup>80</sup> Some items that may come in contact with non-intact skin (e.g. hydrotherapy tanks) may require an intermediate level disinfectant (e.g., isopropyl alcohol, chlorine). Non-critical items (e.g., blood pressure cuff) are in contact with intact skin but not mucous membranes, and generally require an Environment Protection Agency (EPA) approved low-level chemical disinfectant to clean (Table 4).<sup>43,80</sup>

Based upon the CDC definitions, IASTM would be considered a non-critical item since the instruments are in contact with intact skin and no mucous membranes or other sterile tissues.<sup>43,80</sup> In contrast, a related study by Nielsen et al<sup>43</sup> regarding safety guidelines for Gua sha and Baguan (wet or dry cupping) suggested that Gua sha instruments be considered a semi-critical item due to the risk of transfer of blood borne pathogens and other fluids during treatment.<sup>43</sup> This requires the use of sterilization or high level chemical disinfectants to clean the Gua sha instruments and a safe handling protocol using personal protective equipment (e.g. gloves, mask, face shields).<sup>43</sup> The researchers based their final recommendations on an addendum written after the original article received negative feedback from readers,<sup>81</sup> instead of scientific evidence to support these recommendations. The goal of IASTM is to create changes to the soft tissue without producing the same effects (e.g. petechiae) as Gua sha.<sup>34</sup> A related case study<sup>82</sup> reported the diagnosis of a herpes simplex viral infection secondary to acupuncture and cupping, while another review cited several reports of acupuncture related infections.<sup>83</sup> The incidence of IASTM related or induced infections has not been reported. Thus, the potential

Table 4. Center for Disease Control Levels of Disinfection. <sup>80</sup>	
High-level disinfection	These disinfectants kill all organisms, except high levels of bacterial spores, and is effected with a chemical germicide cleared for marketing as a sterilant by FDA. Typically, they are not used for generalized disinfecting.
Intermediate-level disinfection	These disinfectants kill mycobacterium, most viruses, and bacteria with a chemical germicide registered as a "tuberculocide" by EPA.
Low-level disinfection	These disinfectants kill some viruses and bacteria such as HIV and HBV with a chemical germicide registered as a hospital disinfectant by the EPA.
EPA: Environmental Protective Agency FDA: Federal Drug Administration	

risk for infection may be less with IASTM, and cleaning instruments may only require the use of a low or intermediate level disinfectant.

The following proposed recommendations are a starting point to develop best practice standards for IASTM instrument hygiene and safe treatment (Table 5) *For cleaning the IASTM instrument*, it is recommended that an intermediate-level disinfectant be used, which often has less handling precautions than high-level disinfectant.<sup>80</sup> The intermediate-level disinfectants (e.g. isopropyl alcohol) are stronger than low-level disinfectants and are available in different size commercial wipes and sprays, which make them practical for different sports medicine settings. After disinfecting the instrument for the recommended amount of time, it is advised to flush the instrument with soap and clean water to wash away any dried chemical disinfectant on the instrument.

This procedure should be done after every patient treatment. If the tool contacts blood, bodily fluids, mucous membranes, or non-intact skin, then proper disinfecting with a high-level disinfectant or sterilization should be done to ensure proper cleaning of the instrument before reuse.<sup>43,80</sup> The professional should use good clinical judgement and disinfect instruments appropriately to ensure patient safety. *For lubricants*, its recommended to extract a treatment size amount from the primary container and place it into a secondary container such as a paper cup before treatment. This can be done using a tongue depressor and following personal protective equipment guidelines, as needed. This will help prevent contamination of the primary container.<sup>43,81</sup>

The recommended IASTM safe treatment sequence is described in six steps (Table 5). *First*, before and after treatment the clinician's hands should be

**Table 5.** *Instrument Hygiene and Safe Treatment Sequence Recommendations.*

<i>Tool disinfecting:</i> use an intermediate-level disinfectant to clean instrument. Flush instrument with soap and clean water before treatment. If the tool contacts blood, bodily fluids, mucous membranes, or non-intact skin, then proper disinfecting with a high-level disinfectant or sterilization should be done.	
<i>Safe treatment sequence:</i> Wash hands and wear personal protective equipment as needed. Its recommend following the safe treatment sequence outlined in the <i>instrument hygiene and safe treatment section</i> of the commentary.	
Safe Treatment Sequence Recommendations	
<b>Step 1</b>	Before and after treatment the professional's hands should be cleaned. CDC guidelines recommend hand washing with soap and water or rubbing hands together using an alcohol-based hand sanitizer (e.g., gel or wipe) for a minimum of 15 seconds. <sup>84</sup> Sports medicine professionals may choose to follow PPE guidelines and wear gloves during treatment but should still follow pre and post hand hygiene procedures. <sup>43</sup>
<b>Step 2</b>	Before treatment, the body region is inspected and cleared for treatment. Then the patient's skin (at the treatment site) is cleaned with a low-level sanitizing wipe (e.g. Purell®) that is safe for the skin, or 60-70% isopropyl alcohol to further reduce the risk of infection. <sup>85-87</sup>
<b>Step 3</b>	The IASTM treatment is administered using the lubricant and PPE procedures, as needed.
<b>Step 4</b>	During the prescribed treatment, the sports medicine professional monitors for changes in the patient's status (e.g., skin color changes such as petechiae, sensitivity to treatment, etc.)
<b>Step 5</b>	Upon completion of treatment, the body region is re-inspected and cleaned again using a sanitizing wipe or isopropyl alcohol.
<b>Step 6</b>	The sports medicine professional concludes with post treatment hand hygiene, disposing of any PPE, and cleaning of the instruments.
PPE: Personal protective equipment (e.g. gloves)	
CDC: Center for Disease Control	



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cleaned. Hand hygiene is the first step in reducing the risk of infection. This may seem intuitive to sports medicine professionals, but this task may be forgotten if the professional is busy. CDC guidelines recommend hand washing with soap and water or rubbing hands together using an alcohol-based hand sanitizer (e.g., gel or wipe) for a minimum of 15 seconds.<sup>84</sup> Professionals may choose to follow personal protective equipment (PPE) guidelines which refer to wearing protective clothing, helmets, goggles, and gloves to protect from injury or infection.<sup>43</sup> Professionals should wear gloves during treatment but also follow pre and post hand hygiene procedures. *Second*, before treatment, the body region is inspected and cleared for treatment. Then the patient's skin (at the treatment site) is cleaned with a low-level sanitizing wipe (e.g. Purell®) that is safe for the skin, or 60-70% isopropyl alcohol<sup>185-87</sup> to further reduce the risk of infection. *Third*, the IASTM treatment is administered using the lubricant and PPE procedures, as needed. *Fourth*, during the prescribed treatment, the rehabilitation professional monitors for changes in the patient's status (e.g., skin color changes such as petechiae, sensitivity to treatment, etc.). *Fifth*, upon completion of treatment, the body region is re-inspected and cleaned again using a sanitizing wipe or isopropyl alcohol. *Sixth*, the professional concludes with post treatment hand hygiene, disposing of any PPE, and cleaning of the instruments (Table 5). Due to the lack of research, the suggested tool hygiene and safe treatment sequence should be considered a starting point for sports medicine professionals and researchers. The suggested best practices should be modified according to the patients' needs and the clinical setting. Further research is needed to determine the safest cleaning and treatment procedures for myofascial instruments.

## ASSESSMENT

Sports medicine professionals should use outcome measures to assess the efficacy of their IASTM treatment. Researchers have used different patient reported outcomes (PROs) and clinical measures to quantify the efficacy of the intervention. For pain and disability, researchers have used PROs such as the numeric pain rating scale (NPRS) or visual analog scale (VAS) to measure pain perception,<sup>35,39,40,51,53,88</sup> and the modified Oswestry Disability Index<sup>51</sup> for

patient function. Researchers have also measured post treatment pain perception with pressure algometry<sup>28,34,40,56,66</sup> and tactile discrimination with a two-point discrimination caliper<sup>56,66</sup> in clinical trials. Researchers have also used clinical measures such as joint ROM,<sup>30,35,53,54,88</sup> electromyography,<sup>89</sup> and functional tests.<sup>35,36,57</sup> It is important to note that the outcomes listed in this section are from IASTM clinical trials and many other PROs and clinical measures may have been used within the published case studies and series on IASTM, while others not listed may be relevant for a specific clinical case or clinical trial.

## CLINICAL IMPLICATIONS

This clinical commentary provides a framework for the development of clinical standards for IASTM. Currently, IASTM lacks best practice guidelines which creates a challenge for both sports medicine professionals and researchers. The current lack of clinical standards warranted a discussion describing the intervention, indications, precautions, contraindications, tool hygiene, safe treatment, and assessment, with the following resultant clinical suggestions:

- *For describing IASTM*, sports medicine professionals should consider describing the intervention as a myofascial tool intervention only, or as part of an IASTM treatment paradigm, such as Graston® or ASTYM®, when the appropriate protocol has been followed. These and other paradigms often use a multimodal approach combining IASTM with other adjunct treatments (stretching, exercise, other modalities, etc.). This clarification and use of reporting guidelines may help create a better understanding for fellow professionals and patients, allow for clinical replication, and improve systematic analyses.
- *For indications*, IASTM has demonstrated efficacy in the treatment of several musculoskeletal conditions and may be used as a part of a warm-up before physical activity. Researchers have also found that IASTM may influence local temperature and circulation,<sup>60</sup> mechanoreceptor and nociceptor activity,<sup>56,66</sup> and may aid in connective tissue remodeling.<sup>68,69</sup> The list of indications should constantly evolve as sports medicine professionals and researchers further learn the utility of the intervention.

- The precautions and contraindications discussed here should be considered a starting point in developing more specific guidelines. Sports medicine professionals may want to create their own list based upon their patient population and clinical practice. For tool hygiene and safe treatment, the proposed guidelines for tool disinfecting and safe treatment should also be considered a starting point. Professionals should follow proper tool hygiene procedures and develop their own safe treatment sequence to reduce the risk of infection for their patients. For assessment, proper assessment of outcomes after IASTM is necessary to determine IASTM efficacy across musculoskeletal pathologies and disorders. Sports medicine professionals may want to consider using PROs and clinical measures reported in the various IASTM studies to assess treatment effectiveness in individual patient scenarios.

## CONCLUSION

This clinical commentary discusses proposed IASTM clinical standards for describing the intervention, indications, precautions, contraindications, tool hygiene, safe treatment, and assessment. To date, these standards have not been discussed extensively in the IASTM literature. The goal of this clinical commentary is to create a starting point for the development of such standards. Sports medicine professionals and researchers are encouraged to build upon the existing information and help further develop best practice standards for IASTM.

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